CLAIMS

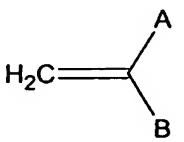
1. Process for the formation of a polymer film on an electrically conducting or semiconducting surface by electrografting, characterized in that it consists:

a) in preparing an electrolytic solution comprising one or more electropolymerizable monomers and at least one source of protons which is chosen from compounds which are Bronsted acids in the said electrolytic solution, the said source of protons being present in an amount of between 50 and 100 000 ppm with respect to the total amount of the constituents of the said electrolytic solution; and

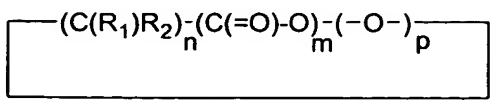
b) in electrolysing the said solution in an electrolysis cell by using the conducting or semiconducting surface to be covered as working electrode and at least one counter electrode, to result, by electroreduction or electro-oxidation of the said solution, in the formation of an electrografted polymer film on the said surface.

2. Process according to Claim 1, characterized in that the Bronsted acids are chosen from water; hydrogen fluoride; ammonium fluoride; nitrous acid; molecules carrying carboxylic acid groups or ammonium, amine, pyridinium or phenol groups; sulphuric acid; nitric acid; hydrogen chloride; perchloric acid and molecules carrying sulphuric, sulphonic or thiol groups.

3. Process according to Claim 1 or 2, characterized in that the electropolymerizable monomers are chosen from activated vinyl monomers and from cyclic molecules cleavable by nucleophilic attack corresponding respectively to the following formulae (I) and (II):



(I)



(II)

in which:

- A, B, R_1 and R_2, which are identical or different, represent a hydrogen atom; a C_1-C_4 alkyl group; a nitrile group; an organic functional group chosen from the following functional groups: hydroxyl, amine: $-NH_x$ with x = 1 or 2, thiol, carboxylic acid, ester, amide: $-C(=O)NH_y$ in which y = 1 or 2, imide, imidoester, acid halide: $-C(=O)X$ in which X represents a halogen atom chosen from fluorine, chlorine, bromine and iodine, acid anhydride: $-C(=O)OC(=O)$, nitrile, succinimide, phthalimide, isocyanate, epoxide, siloxane: $-Si(OH)_z$ in which z is an integer between 1 and 3 inclusive; benzoquinone, carbonyldiimidazole, para-toluene-sulphonyl, para-nitrophenyl chloroformate, ethylenic and vinyl, aromatic and in particular toluene, benzene, halobenzene, pyridine, pyrimidine, styrene or halostyrene and their substituted equivalents; a functional group which can complex cations; molecular structures substituted and/or functionalized starting from these functional groups; groups which can be cleaved by thermal or photon activation; electroactive groups; electrocleavable groups; and the mixtures of the abovementioned monomers and groups;
- n, m and p, which are identical or different, are integers between 0 and 20 inclusive.

4. Process according to Claim 3, characterized in that the activated vinyl monomers of formula (I) are chosen from acrylonitrile, methacrylonitrile, methyl methacrylate, ethyl methacrylate, butyl methacrylate, propyl methacrylate, hydroxyethyl methacrylate, hydroxypropyl methacrylate, glycidyl methacrylate, acrylamides, cyanoacrylates, diacrylates or dimethacrylates, triacrylates or trimethacrylates, tetraacrylates or tetramethacrylates, acrylic acid, methacrylic acid, styrene and its derivatives, para-chlorostyrene, pentafluorostyrene, N-vinylpyrrolidone, 4-vinylpyridine, 2-vinylpyridine, vinyl halides,

acryloyl halides, methacryloyl halides, vinyl crosslinking agents or crosslinking agents based on acrylate, on methacrylate, and on their derivatives.

5. Process according to Claim 3, characterized in that the cleavable cyclic molecules of formula (II) are chosen from epoxides, lactones, lactic acid, glycolic acid, oxiranes, and their mixtures and their derivatives.

6. Process according to any one of the preceding claims, characterized in that the concentration of electropolymerizable monomers in the electrolytic solution is between 0.1 and 10 mol/l.

7. Process according to any one of the preceding claims, characterized in that the electrolytic solution additionally comprises at least one solvent chosen from dimethylformamide, ethyl acetate, acetonitrile, tetrahydrofuran and chlorinated solvents.

8. Process according to any one of the preceding claims, characterized in that the electrolytic solution comprises at least one support electrolyte.

9. Process according to any one of the preceding claims, characterized in that the content of Bronsted acid is between 50 and 10 000 ppm.

10. Process according to any one of the preceding claims, characterized in that the electrically conducting or semiconducting surface is a surface made of stainless steel, steel, iron, copper, nickel, cobalt, niobium, aluminium, silver, titanium, silicon, titanium nitride, tungsten, tungsten nitride, tantalum, tantalum nitride or a noble metal surface chosen from gold, platinum, iridium or iridium platinum surfaces.

11. Process according to any one of the preceding claims, characterized in that the electrolysis of the electrolytic solution is carried out by polarization under potentiostatic or galvanostatic voltammetric conditions.

12. Electrically conducting or semiconducting surface, characterized in that it is capable of being obtained by employing the process as defined in any one of Claims 1 to 11 and has at least one face covered with an electrografted polymer film.

13. Surface according to Claim 12, characterized in that the polymer film has a thickness of between 10 nm and 10 µm.